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ON OBSTRUCTION OF THE INFERIOR VENA CAVA, WITH CASES.

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OBSTRUCTION of the inferior vena cava is of sufficient rarity to make the discussion of the condition and the effects to which it gives rise one of interest both to the physician and to the surgeon. Notwithstanding what has been stated by Dr. Goodhart in his remarks on a case¹ which had been recently brought before the Pathological Society, to the effect that these cases must not be looked upon as rare because they are not recorded in the literature of the day, and that many could be found if the post-mortem records of the different hospitals were searched, I am inclined to think that they are rare for several reasons, one of the most important of which is that physicians who have brought forward cases at the Pathological or other societies have seldom referred to similar ones which have been under their own care, which they have themselves seen in consultation or under the treatment of colleagues. Searching the literature on the subject I find the references to cases are limited, and some of these have been translated from French or German publications as examples of an unusual disease. The large majority of

¹ 'Med. Times and Gazette,' vol. i, p. 494, 1885.

these recorded cases have been, as one would expect, under the care of the physician or obstetric physician; there are surprisingly few recorded by surgeons, but these are of greater clinical interest. The spread of a thrombus during the course of an attack of pyæmia appears to be the commonest cause of obstruction, whether this be secondary to a septic condition of the uterus, and the extension of a clot to the pelvic veins from that organ, or to blood-poisoning of unexplained origin. Examples of this condition are to be found in the 'Transactions of the Pathological Society,' for instance,¹ Dr. Gibbons: Female, æt. 20, lived eighteen days after symptoms of puerperal fever. Here there was a firm, buff-coloured, fibrinous clot adherent to the walls of the vena cava extending into the iliac and femoral veins. There was also embolism of the middle cerebral artery. Again,² Dr. Hewitt: Female, æt. 33; lived twenty-five days after the onset of puerperal phlebitis. The vena cava was occupied by a loose, imperfectly formed clot of light colour extending into the iliac veins. And another by the late Dr. Moxon:³ A female, who died from pyæmia. *Post-mortem*.—Purulent thrombosis of the inferior vena cava; channel of vena cava imperfectly closed by the clot, which extended into the left renal vein, but there was no suppuration in this kidney. No emaciation, and but little œdema of the lower extremities. Whilst some of my readers will remember the unpublished case of a stout young married woman who died in the Alexandra Ward of St. Thomas's under the care of Mr. Croft during the course of this last summer. She had thrombosis of a puerperal character, with enormous œdematous enlargement of the lower extremities, the œdema, which extended up to the chest posteriorly, being extremely brawny in character. I must also refer to a case mentioned by Warren⁴ as having occurred in the Rotunda Hospital in Dublin, where a thrombus spread from the uterus after the injection of perchloride of iron solution into its interior.

Next in frequency are those cases in which the condition

¹ Vol. v, p. 11.

² Vol. ix, p. 59.

³ Vol. xxi, p. 145.

⁴ 'Trans. of Acad. Med., Ireland,' vol. i, p. 154, 1883.

developed from the pressure of a tumour on the vein, and of these there are examples as follows.¹ Dr. S. Wilks: Vena cava and hepatic vein obstructed by fibrous deposit in the liver. The patient was a sailor, æt. 35, suffering from ascites and swelling of the legs.² Dr. Little: Malignant disease of the liver from a man, æt. 36. Symptoms (not given) for three months; complete occlusion of the vena cava. Reference was also made to another case.³ Dr. Legg brought the case before the Pathological Society⁴ of a man, æt. 60, who had suffered from cardiac disease and phthisis without albuminuria, who died from exhaustion. A clot, partly adherent, starting from the position of a small aneurysm on the left internal iliac artery, extended into the inferior vena cava and internal iliac vein of the other side, but not into the femoral. There had been no definite history or symptoms, but the legs had been swollen eight months before death; the swelling had subsided, but returned during the last three months. Again,⁵ Dr. Turner: Secondary malignant growth of the right kidney invading the inferior vena cava above the junction of the renal vein, from a man, æt. 44. The symptoms due to the obstruction of the large vein are not given. In the same volume⁶ Dr. Colcott Fox: Primary sarcoma of the left suprarenal capsule from a child, æt. 2. In this case the clot extended into the auricle. There had been enlargement of the abdomen for four months, but the collateral venous channels were not markedly dilated. In the '*Lancet*'⁷ Dr. Bristowe, in his lectures on "Visceral Syphilis," mentions a case under his care in which enlargement of the veins had been noticed for two years. The disease was in the tertiary stage, and incomplete recovery followed treatment. There was great dilatation of veins in the wall of the chest and abdomen, and other lesions. And Mr. Holmes, in his '*System of Surgery*,'⁸ refers to museum specimens.

¹ '*Path. Soc. Trans.*,' vol. xiii, p. 122.

² '*Transactions of the Dublin Path. Soc.*'

³ Gély, '*Gaz. méd. de Paris*,' 1840, No. 45.

⁴ Vol. xxvi, p. 104.

⁵ Vol. xxxvi, p. 275.

⁶ P. 460.

⁷ 1885, vol. i, p. 331.

⁸ Vol. iii, p. 71. Middlescx, series vi, 32, 35, vena cava obliterated by pressure from an aneurysm; St. Thomas's, γ 171, vein filled with encephaloid deposit; Guy's, 1521⁶⁵, vena cava obliterated by the side of a dried-up hepatic abscess,

As an example of thrombosis coming on during the course of other diseases, and possibly as a consequence of changes in the blood, condition of walls of vessels, or rate of circulation produced by such diseases, I may mention the case of a man who was under the care of Dr. Milner Moore, of Coventry,¹ for a fracture of the femur, during the treatment of which pneumonia developed, and thirty-nine days after the accident thrombosis of the left thigh, which spread to the vena cava. There was much œdema and pain. Ultimately the man recovered under treatment, hot fomentations, purgatives, and diuretics. I am indebted to Mr. Mackellar for permission to publish the following case, which was under his care, and markedly illustrates this spreading thrombus.

CASE 1. Thrombosis of veins of the left leg, subsequently spreading to the right side and involving the inferior vena cava, in an anæmic girl, who died ultimately from thrombosis of the cerebral sinuses.—A. D—, æt. 19, single, a barmaid, was admitted to No. 24, Elizabeth Ward on the 6th, and died on the 25th of November, 1886. The following account is abstracted from notes by the dresser, Mr. M. H. Spencer :

The family history was good.

Previous history.—She has never had any serious illness, but states that she was laid up with indigestion and “enlarged liver,” six months ago. She has never suffered previously from any pain or swelling in the legs, and has not been subject to varicose veins. The veins of the legs have been prominent but not varicose. She has been in the habit of standing for fifteen hours a day for some time.

Present illness.—On October 29th the patient was first troubled by pain in the left leg; it was confined at first to the leg and ankle, and there was a good deal of redness about the calf. She did not feel ill, and still kept about on the leg. The pain, however, increased, extending up the inner side of the leg to the groin, and the glands in the groin became very tender and enlarged. The leg at the same time began to

and 1521⁹⁰, by pressure from enlarged glands; Guy's, 1522⁷, ¹⁵, ²⁵, growth of cancer into superior vena cava; St. Bartholomew's, 13 and 29, fleshy growth between vena cava and kidney, obliterating the former.

¹ ‘Lancet,’ 1884, vol. i, p. 1026.

swell, and on Thursday the 4th inst. she was obliged to take to her bed. The pain was now very severe, keeping her awake at night. She had medical advice, and the limb was wrapped up in cotton wool. Her bowels are usually constipated, and have been more so lately than usual. The catamenia have always been regular.

On admission, she is an anæmic, rather delicate-looking girl, complaining of pain and swelling in the left thigh and leg. On examination, the left leg is found to be much hotter than the right, and a good deal swollen. The veins in the thigh along Poupart's ligament are injected on the left side. The pain seems to be severe, and the leg is tender on pressure, especially about the calf and above the knee on both the inner and outer sides; the ankle is also tender on pressure. There is distinct pitting on pressure along the inner side of the shaft of the tibia and over the ankle-joint; there is no pitting over the calf, but it feels tense. The tongue is somewhat furred and the bowels are constipated. Pulse regular, rather feeble and compressible. Temp. 102.2° . There was no cardiac murmur.

Perfect rest was enjoined, a brisk aperient given, and the patient placed on fever diet, No. 2, with tea, two eggs, and an ounce of red wine. Glycerine and extract of belladonna was applied to the affected leg.

6th.—Iodide of potassium and a vegetable tonic with chloroform was prescribed.

9th.—Pain not quite so severe. Bowels open. Has passed a good night.

10th.—More pain to-day. Cotton wool only applied to the leg, which still feels much better than the other one.

11th.—Expresses herself as feeling better this morning and has less pain.

13th.—Pain still decreasing, but had some during the night.

15th.—This morning she is complaining of pain in the right leg; it commenced in the groin and spread downwards along the course of the internal saphena vein. There is not much œdema of the limb and no pitting on pressure. The small veins about Poupart's ligament are injected as on the left side. The left leg is better, there is no pain in that now. The œdema has subsided to a large extent. The internal saphena

vein can be felt, but not so distinctly as on Friday last. She suffers much pain in the right leg. Her temperature has risen this morning to 103.2° . Mist. Pot. Citr. Eff. \mathfrak{zj} 6tis horis.

16th.—Left leg continues to improve, but the right is more painful and swollen, the pain being greatest in the calf.

17th.—The right leg is still more painful this morning, and there is pain and hardness over the right side of the abdomen, and the superficial veins of that part and the right leg are more dilated. She was ordered five grains of sulphate of quinine three times a day.

18th.—No improvement, pain still very severe, the right leg is a good deal more swollen, and the œdema increases daily, there being distinct pitting on the inner side of the leg, whilst the internal saphena vein can be felt distinctly. The most painful parts are the calf, and the inner side of the thigh, also at a point in the right iliac region parallel to Poupart's ligament. The left leg is now of its normal size, and there is no pain or tenderness on pressure, but the veins over Poupart's ligament continue enlarged. Pil. Opii gr. \mathfrak{j} , three times a day.

19th.—Rather better, and suffering less pain.

21st.—Diarrhœa, a mixture of chalk and catechu with fifteen minims of Tinct. Opii ordered.

23rd.—Patient complains this morning of very severe headache; she suffered a good deal from it last night. The pain commences at the upper part of the frontal bone and extends over the back of the head to the occiput. The temperature is normal. There is some swelling on the right side of the face, and she has a decayed tooth on that side, but does not complain of toothache. The pain in the head extended down to the back of the neck. An icebag was applied to the head.

24th.—Yesterday afternoon the patient's condition became worse; she vomited several times, the substance brought up on one occasion resembling coffee grounds. She has been very drowsy all night, not answering to questions, and seeming to be unconscious, passing her motions under her. Some slight twitching was noticed in the arms this morning, between seven and eight. The pupils were dilated but sensitive and acting to light and accommodation. There is no hemiplegia

or other paralysis, and she seems to be in a condition from which she might possibly be roused. There has been frequent vomiting, but not of a dark character. Is taking brandy, milk, and eggs. During the evening the temperature began to rise, and the patient's condition became progressively worse. She continued to pass her motions under her. The pupils became less sensitive to light and acted but feebly. She seemed just able to swallow, but there was continued rigidity of jaw, and she had to be fed by a nasal tube. Rigidity of the muscles became at times marked, at other times absent. The legs were drawn up towards the abdomen. The heart-beats were irregular, a number of quick successive beats being followed by a slower rhythm which would then give way to a quicker one. She remained unconscious and quite incapable of being roused. The temperature continued to rise. The breathing as well as the heart-beat became irregular, and she sank rapidly dying, at 6 a.m. of the 25th. The following is the temperature chart :

	a.m.		p.m.		a.m.		p.m.
6	...	—	102·2°	17	...	100·8°	103°
7	...	101°	102·2°	18	2 a.m.	102°	—
8	...	101·8°	102°	9.30	„	101·2°	101·6°
9	...	101°	101·8	19	...	100·2°	100°
10	...	100·8°	101·4°	20	...	100·4°	100°
11	...	100·6°	100·4°	21	...	98·6°	100·4°
12	...	99·8°	100°	22	...	99·4°	98·6°
13	...	99·6°	99·6°	23	...	98·6°	98·8°
14	...	100°	100·8°	24	a.m. 100° ; 2 p.m. 99·8° ; 6 p.m.		
15	...	103·2°	103·2°		101·2° ; 11.30	103°	
16	...	102·4°	103·2°	25	4 a.m. 106·2° ; 6 a.m.	102·4°	

There was some difficulty in obtaining a post-mortem examination, but Dr. S. W. Wheaton, to whom I am indebted for the account, undertook it at short notice and at personal inconvenience. The body was very pale and anæmic. Rigor mortis was present. There was a large amount of subcutaneous fat of a bright yellow colour. There was slight œdema of the legs.

Heart small, muscle pale, valves healthy, large recent branching clot in the pulmonary artery. The lining of the larger arteries was very white and not stained by the blood.

Lungs, great congestion inferiorly. Half a pint of clear fluid was present in the right pleura, but there was no pleurisy. Liver not enlarged, pale, fatty. Spleen, soft, diffuent, not enlarged. Kidneys and suprarenals apparently normal. Uterus, ovaries, bladder, and intestines normal.

On examining the abdominal veins there was thrombosis of the left external iliac vein, softening decolourised clot extending into the vena cava to the level of the renal veins, where it presented a free rounded end. There was thrombosis of both internal iliac veins, evidently more recent. There was also one old thrombus in a uterine vein on the left side, but it did not extend either to the uterus or to the internal iliac vein. On opening the head there was no thrombosis of the superior longitudinal sinus. The surface of the brain was markedly congested. Both venæ Galeni were thrombosed and filled with firm adherent clot, the thrombosis extended to the inferior longitudinal sinus and throughout the left lateral sinus and down the internal jugular vein, it also extended halfway up the right lateral sinus. There was no thrombosis of the cavernous sinuses, and the arteries at the base were normal, but there was a large amount of clear serum at the base, but no excess of fluid in the lateral ventricles. The basal ganglia on both sides, the crura, internal capsules, and parts lining the ventricles were softened, diffuent, and contained scattered hæmorrhages. The rest of the brain was normal. No tubercles were seen.

I am inclined to regard the anæmia in this case, with the altered condition of the blood in the disease, as a predisposing cause of the thrombosis, so many cases of thrombosis of the veins of the lower extremities in young girls have been under my observation during the last few years where this change in the blood was present before the onset of the blood-clotting, and formed a marked feature in the case.¹ The thrombosis of the cerebral veins is such an exceedingly rare condition, excepting in disease of the petrous bone or pyæmia, that the symptoms which it caused will be specially noted.

I now pass to the consideration of that group of cases

¹ I may say more than this; it is rare to find thrombosis of veins in girls who are not markedly anæmic.

² See Note A.

where the presence of very large and tortuous veins on the surface of the body, and also, in some cases, on the lower extremities, possibly unaccompanied by any other evidence of venous obstruction, attracts the immediate attention of the observer. Eppinger¹ records a case of cicatricial obliteration of the inferior vena cava, with dilatation of the superficial veins, and describes the collateral venous circulation as found post mortem. The following case, which was under the care of Mr. S. Jones, to whom I owe permission to publish it, illustrates fully the point mentioned—the dilatation of superficial veins and other evidences of extensive obstruction to the deep veins.

CASE 2. *Enormous dilatation of the superficial veins of the lower abdomen and thighs, with gangrene of the feet, for which amputation was performed.*—The patient, J. S—, æt. 38, ship's broker, from Liverpool, was admitted on May 14th, 1881, and remained under treatment until April 5th, 1882.

He was a short, rather squarely-built, but somewhat poorly nourished man, with an anxious look. He gave the following history. Until eight years before the date of admission he had been strong and healthy; he then had an attack of typhoid fever, and has not been well since, suffering from cold feet, &c. Three years after the attack of typhoid he had what was called by the medical man who saw him "phlegmasia dolens" of both legs; this was accompanied by swelling of both legs and severe pain across the lumbar region, and later by gangrene of the left foot, which was amputated a few weeks afterwards. The right foot appears to have been unaffected by gangrene until April 5th, 1881, when a small blister formed on the dorsum of the second toe. This gradually sloughed off, and then the gangrene spread to the third and fourth toes, slowly extending with much pain until admission, when there was extending gangrenous condition of all the toes of the right foot, and of the base left after separation of the third; this was most marked in the third, fourth, and fifth toes. There was œdema, redness, and swelling extending from the gangrenous portion up the foot and leg; there was no line of demarcation, and the thin dis-

¹ 'Prager med. Wochenschrift,' Nos. 39, 40, 1876.

charge, of small quantity, was extremely offensive. He complained of great pain, and was in a very irritable condition, sleeping badly. The left foot had been removed at the ankle by Perogoff's operation, and beyond a slightly œdematous condition, the stump appeared healthy. Examination of the thighs and trunk showed greatly dilated and tortuous veins passing from the thighs up to the chest, larger on the right than on the left side, some of them being as large as a finger, gradually diminishing in size until they reached the level of the third rib, when they could no longer be distinctly traced, and it appeared probable that they gradually emptied their contents into the intercostal veins. The veins in each lower extremity were much larger than normal. No tumour could be detected in the abdomen, and the liver and spleen appeared normal; there was no evidence of ascites. The chest was well developed, the lungs apparently normal but emphysematous. The heart was enlarged, but the sounds were normal. Pulse feeble. There was no albuminuria. Skin and hair dry. Temperature normal.

Charcoal and linseed poultice was ordered; changed on May 20th to carbolic oil dressing. Stimulants and opium were also ordered on that date.

It was not until July 11th that the toes had separated, leaving the four outer metatarsal bones bare and projecting, with ligaments still adherent but in a sloughing condition; the granulating surface was commencing to skin over, and was extremely sensitive to touch.

On August 14th the projecting pieces of bone were removed with forceps; this operation caused extension of gangrene on the outer side of the foot, the small slough not separating completely until September 2nd.

By October 19th the condition of the right foot had not improved to any great extent; although the sloughs had separated on the dorsum of the foot, gangrene appeared to be extending very slowly along the sole.

Up to this date the temperature had been almost normal both morning and evening, excepting on the evening of May 31st, when it rose to 100·6°.

Mr. Sydney Jones decided to remove the foot, and performed Syme's amputation (October 19th) with antiseptic

precautions. Ether was the anæsthetic administered. After the operation the patient's temperature fell to 96°, but rose next morning to 98°, the pulse being 106.

24th.—Bowels confined since the 19th, has complained of much pain in the stump, and has been unable to sleep without morphia; the stump is sloughing, and emits a very fetid odour; has vomited several times after food and medicine. Pulse 108, feeble. On the following day antiseptic dressing was left off, and charcoal poultices again employed.

November 1st.—The patient is stronger, though pulse is still very feeble, 100.

5th.—Chlorinated soda again used.

28th.—There has been cellulitis of the leg, for which several incisions were made to let out pus.

December 12th.—The granulating surface being healthy, skin grafting was tried, and two or three of the grafts took; each graft was dipped in boracic acid lotion, placed on the granulating surface, and covered with a piece of gutta-percha tissue; this process was repeated on the 12th and 19th, and several other grafts took.

January 21st, 1882.—A small abscess had formed on the outer side of the leg above the stump. Lotio Zinc. Sulph. to be used as a stump dressing.

February 6th.—The stump was again grafted, the surface exposed being less than the size of a halfpenny. Again grafted on the 18th. The dressing was changed to oxide of zinc ointment on the 10th, and to iodoform powder on the 24th, when the wound was quite dry. On March 30th the line of cicatrix had given, forming three small indolent ulcers, which appeared under the scab caused by the use of the iodoform; warm-water dressing was substituted, and the cicatrix became firm, patient leaving the hospital on April 5th, using knee-rests and crutches to get about.

After the amputation, and until November 5th, the temperature in the evening had an average of 2° higher than that in the morning; afterwards the changes were not important.

I have been unable to trace this patient since he left the hospital, so as to obtain further record of his case, but have been informed that he was alive and in fair health two or three years ago. His symptoms differ from those of others

recorded inasmuch as gangrene of the feet of the moist variety followed the obstruction of the vena cava, and in all probability this formation of gangrene was due to extension of clot into the femoral veins, first on one side and then on the other. From the history it would seem probable that the disease commenced in the vena cava, and the weak heart and poor circulation which followed the attack of typhoid fever had much to do with it, but no exciting cause could be discovered.

This case proves that such a severe affection as complete blocking of the inferior vena cava is not necessarily fatal, and there are others published which prove that a man may even follow his occupation. Mr. G. R. Turner¹ mentions a sailor, æt. 30, under his care at the Seamen's Hospital, who had had enlargement of his veins for twenty years. He was well nourished and muscular, and knew of no cause for the condition. Mr. Mansell Moullin, in 1885, brought a case before the Clinical Society, of a pensioner, æt. 35, suffering from varicose veins and ulceration of left lower extremity, following a fall across a handrail one year and nine months before; enlargement of the veins in the lower abdominal wall was noticed three weeks after the injury. There were three main groups of veins, from which great coils of enormously distended veins stretched upwards, gradually diminishing in size as they reached the thorax; left limb much swollen. Mr. Moullin kindly tried to trace this man so that I might see him, but was unable to do so. A man died under the care of Robin in 1884² of whose case the following is a short extract. The cause was violent exertion while stooping. He lived twenty years after the first symptoms, which were noted by Becquerel. These were, intense lumbar pain lasting six to seven weeks, very severe at first, fever, delirium, extreme abdominal tenderness. The abdomen enlarged and the bowels were constipated. The veins slowly enlarged for two years. The urine was scanty and albuminous and micturition difficult. The onset of dropsy was deferred but general and excessive (renal). It is unique for the treatment adopted by a quack to whose tender mercies he passed later, for the patient was suspended by his hands and feet in a bent position for twelve

¹ 'Lancet' for 1886, vol. i, p. 443.

² 'Archives de Physiologie,' and 'Lancet,' vol. i, p. 1026, 1884.

hours. Profuse diuresis and sweating followed this, and the dropsy diminished, but the circulation continued inadequate in the legs, leading to ulcers, eczema, &c. Death occurred finally from visceral hæmorrhages. Warren¹ describes the condition found post mortem in a man, æt. 22, who had died from typhoid. This man had had characteristic enlargement of the veins of the trunk and lower extremities as long as he could remember, without ascites or albuminuria. A fibrinous vegetation which had undergone calcareous degeneration was found in the vena cava, just below the auricle, attached by a pedicle to the great Eustachian valve and completely adherent. The vena cava was the size of a quill, forming a fibrous cord, from the level of the diaphragm to the entrance of the renal vessels.

The symptoms which follow the blocking of the inferior vena cava are dependent upon the question as to whether this is acute in its onset or gradual; whether the thrombus has formed in the main vein, or extended into it from other veins. They also vary according to the extension of the thrombosis upwards or downwards. The most marked symptom, as already mentioned, is the formation of a plexus or plexuses of enlarged and varicose veins over the abdomen and occasionally in the flanks, the lumbar region, and lower extremities, with the presence in some recorded instances of varicocele, hæmorrhoids, and dilated veins in the penis and scrotum. When this condition, which is described in the case of W. M—, has been once seen it is not likely to be mistaken; the enormous size to which the veins may attain being hardly credible to those who have never seen it. This evidence is well illustrated by a plaster cast in the museum of St. Bartholomew's Hospital, and by a photograph in my possession taken from a man who was under the care of Dr. Gulliver in the out-patient department of St. Thomas's.² It differs in this respect from those instances of enlargement of the hypogastric veins sometimes found in sufferers from varicocele and a varicose state of the veins of the leg. It must be remembered that a diseased condition of the veins of the hypogastric region may be present without obstruction to the

¹ 'Trans. Acad. Med., Ireland,' vol. i, p. 155, 1833.

² See Note B.

current of blood, which normally in them is from above downwards.¹ A healthy married woman came to the outpatient department of St. Thomas's Hospital some months ago, when I was doing duty there, with considerable enlargement of the hypogastric veins and of those in the left labium major; she complained of pain and fulness in these, especially towards the end of the day. The disease was limited to this part of the venous system and relief was given by a specially devised belt. Again, the following case which Mr. S. Jones has kindly permitted me to publish, probably illustrates a local disease of these veins.

CASE 3. Varicose condition of lower abdominal wall; operation; nephritis; recovery.—W. M—, æt. 31, a printer, was admitted under the care of Mr. S. Jones on June 21st, and left on the 15th September, 1888.

Family history.—His father died of rupture of a blood-vessel at the age of twenty-one.

Previous history.—He had scarlatina at the age of thirteen, which resulted in the loss of his left eye a few months later. This was excised at Moorfields. Shortly after recovery from scarlatina, large veins were noticed in the lower part of the abdomen and groins, and three years later these were operated on by Mr. S. Jones. After this they returned, and a second operation was performed three years later by means of red-hot wires passed across the part affected. The varicose veins appeared again four years ago and have been increasing in size since, causing aching pain. He has had what was said to be "acute rheumatism," chiefly affecting the muscles of the back; the first attack was three years ago, the second, one year ago. He was in bed for six weeks on each occasion.

On admission.—A strongly-built, big, stout man. Complained of weight and pain in a series of large veins over the lower abdomen.

These large veins, which varied in size, were some of them as big as the little finger of a man; tortuous and knotted they merged below the umbilical region into two or three main trunks which gradually disappeared about the level of the

¹ See paper on the "Abdominal Veins," 'Trans. International Med. Congress, 1881.'

umbilicus, apparently passing into the thick subcutaneous tissue. They were most numerous above the pubes. The direction of the blood current was not seen. The veins of the trunk elsewhere were not visibly enlarged.

The skin presented several circularly shaped scars, the result of the treatment by hot wire on former occasions. The scrotal veins are enlarged, and there is a very large one in the right inguinal canal. They are much increased in size when the patient stands up. There was no swelling of the leg. General health good. Urine, sp. gr. 1025, acid, no albumen, no sugar.

On July 4th Mr. S. Jones operated and dissected out the enlarged veins, removing at the same time a quantity of subcutaneous fat which surrounded them. One large vein was found extending towards the left groin, and communicating with the left femoral; this was ligatured where it disappeared from view.

The operation was performed with full antiseptic precautions, antiseptic dressings were applied, and a drainage-tube inserted.

Suppuration of the wound followed to a limited extent, and dressing was changed to boracic acid lotion on July 3rd, but the patient continued well until July 25th, when he had a rigor, and his temperature rose to 102·6°. He complained of headache and vomited. Temperature, p.m., 103°.

26th.—Sickness continued. Temp. 101°—101·6° Was ordered four grains of citrate of caffeine and twenty of salicylate of soda, every two hours.

27th.—Temp. 102·2°—103°. Milk diet ordered.

On the 28th bismuth mixture was substituted.

30th.—Temp. 98° this morning. Patient feels better. There is nothing in wound to account for the high temperature. The discharge is copious, and a tube is kept in the lower opening.

Aug. 2nd.—Five grains of citrate of caffeine to be taken three times a day.

3rd.—For the last two or three days he has complained of swelling and fulness below the right knee. This is being treated with belladonna and glycerine, and a McIntyre splint has been applied to-day. He complains of much nausea, but

does not vomit often. Forty grains of compound jalap powder at night.

6th.—The œdema of the right leg has increased; splint removed. He was ordered sulphate of quinine.

24th.—The right leg, which has been swung in a cradle since the 7th, is now no longer œdematous. There has been a slight sore over the right shin, but this has healed. There is still a granulating surface of wound, but only slight discharge.

The rise of temperature on July 25th, preceded by a rigor, the frequent and continued vomiting, with a severe headache, made the onset of an attack of erysipelas feared, but the wound looked healthy and there was no enlargement of the inguinal glands. The rigor was not repeated, and no eruption appeared. Nothing could be found to account for his symptoms until a few days had elapsed, when the urine gave evidence of acute renal disease, being of smoky appearance, scanty in amount, containing blood and much albumen.

The citrate of caffein did not relieve the distressing headache, and the albuminuria only disappeared a few days before he left for home.

This condition may possibly have been due to a venous angioma in the first instance, though the absence of any decided tumour and the distinctness of the individual veins made this doubtful, in spite of the recurrences, whilst the early age at which it developed makes the supposition of disease of the coats simply appear improbable. The swelling of the leg which came on during the after-treatment, may have been caused by extension of a thrombus. It is more difficult to account for the condition of the kidneys, the cause of the attack, and the subsequent recovery of the patient being against the idea of either pyæmia or extension of clot to the renal veins. It is worthy of mention that another man in the ward at the time, who had been admitted for fracture of the leg and concussion of the brain, developed almost exactly the same symptoms and character of urine.

If the clot extends into the deep veins of the leg, and be not of septic origin, there may be much œdema of the limb affected and later enlargement of the superficial veins. Or the interference may lead, as in the second case, that of

W. M—, to gangrene, a rare sequence, or those local diseases found so frequently accompanying varicose veins of a limb.

Various conditions of the dilated abdominal veins, which were not noted in Case 2, must be mentioned as found occasionally in obstruction of the vena cava inferior: 1. The current of the blood can be *seen* to flow from below upwards. 2. The walls of the veins can be made to contract under stimulation. 3. A distinct thrill and bruit can be heard on auscultation. The first of these statements is illustrated in Mr. Mansell Moullin's case, and that of Mr. G. R. Turner, as well as in others. In Robin's case "during life great irritability of the muscular element in the coats of the veins was noticed; they contracted distinctly on stimulation." And in Mr. Moullin's patient, "thrill and bruit in an abdominal swelling, and also in the left lumbar cluster of dilated veins."

In Dr. Colcott Fox's case the thrombus passed into the auricle, but it is rarely found, even in the post-mortem examination of fatal cases, to have extended so far upwards. A more practical question is the amount of interference with the return of blood from the kidneys that can be borne, and it is interesting to read to what extent the renal veins were obstructed by clots of considerable duration, and how the blood was conveyed from such important organs when the main channel for its return was blocked. In Robin's case, where, it will be remembered, there was extensive and general anasarca, from which the man recovered, it was found that the inferior vena cava, from its bifurcation to within three fingers' breadth above the origin of the renal veins, was reduced in size and filled with a calcareous concretion, to which the walls of the vein were united by a dense tissue, although the cavity was not quite obliterated. Both kidneys were greatly enlarged, the right being the seat of many old hæmorrhages. The blood from the right kidney passed partly into the inferior vena cava by the renal vein, which was still permeable, and partly by the inferior diaphragmatic vein. The blood from the left kidney found a freer course by the splenic and inferior diaphragmatic vein. In Dr. Andrews' case, where the obstruction was of considerable, but unknown, duration, "the left renal vein was impervious, the blood from that kidney having been returned partly by a vein passing up into

the left suprarenal capsule, but principally by a large vein passing downwards and backwards to join a venous plexus on the sides of the vertebræ, by means of which the blood from the lower part of the body appeared to have reached the vena azygos, which was of unusual size. The obstruction was due to an organised clot, the vein being converted into a fibrous cord.

In none of the cases, the reports of which I have read, has blocking of both renal veins been found post mortem.

The collateral circulation in these cases of obstruction is easily understood by those possessing a knowledge of the systemic venous circulation, but it may be as well to give the actual condition found on dissection, in a case¹ of elephantiasis orientalis, with cirrhosis of the liver, complicated by blocking of the inferior vena cava near the heart (without œdema). "The vena azygos were as large as the inferior vena cava usually is. The blood being checked when it had arrived within an inch and a half of the auricle, regurgitated into the vena cava, hence its great dilatation, and that of the emulgent, spermatic, hepatic, and especially the lumbar and epigastric veins. One route by which it returned to the heart was by the internal epigastric communicating with the lumbar, mammary, intercostal, and azygos veins and superior cava; another channel, through the lumbar, rachidian, jugular, and vena cava veins. On the left side the superficial epigastric, femoral, iliac, lumbar, smaller vena azygos, great azygos, and superior vena cava, as well as the mammary and intercostals of that side, were channels."

One has been struck, in reading through published cases, with the comparative rarity of swelling of the lower extremities, where complete obstruction of the vena cava has been found after death. It would appear that in some of them no trace of œdema of the legs had been found by the medical attendant, or mentioned by the patient. This is, however, less surprising when we know that the inferior vena cava has been ligatured in animals without the production of such a result.² In all probability it depends, as do the more serious consequences of obstruction of the deep veins, upon the extension

¹ Webb, of Calcutta, referred to by Dr. Colcott Fox.

² 'The Practitioner,' 1883, vol. ii, p. 494, Dr. Brunton.

of the clot downwards to the femoral veins, and the rapidity of its formation. Another very important cause for such œdema of the limbs must be recollected in the interference occasionally met with to the circulation of the kidneys. The presence of ascites would make suspicion point to disease of the liver or heart as at least an accompanying condition.

As a rule, it is not possible to localise the position of the thrombus by abdominal palpation, as nothing can be felt on examination. In Mr. Moullin's case, however, to which reference has been made more than once, an ill-defined tumour could be felt in the abdomen, which was regarded as being caused by the plugged inferior vena cava, with swollen and œdematous tissue around it, but in other cases nothing was found.

The conditions on which obstruction to the return of the blood through the inferior vena cava depend, as recorded in published cases, to which I have had access, are summarised as follows:—The vein may be absent,¹ injured by a fall or by severe strain in bending the body backwards or forwards, or ruptured by external violence,² closed by pressure of tumours from without (including aneurysms) on the vein, blocked by the formation of a concretion in the vein itself, or the extension of a growth into its interior. A thrombus may extend into it from another vein, as a consequence of pyæmia, or form in the vein itself, either from that cause, or the presence of an altered condition of the blood in other diseases, or as an accidental complication during their progress.

The symptoms produced by blocking of the vein are, in addition to those of any pre-existing or accompanying disease, those presented by the blocking of any other vein, altered by the importance of the inferior vena cava in the circulation, and its position in the body. Becquerel gives an account of an acute case, and that is the only one in which such a severe onset was followed by recovery. When less sudden but definite blocking has come on the symptoms of partial interference to the return of the blood stream become evident. Œdema, which usually commences in one lower extremity, is found, the superficial veins become greatly enlarged, even presenting

¹ Dr. Greenfield, 'Lancet,' 1876, vol. i, p. 533.

² Shaw, 'Path. Soc. Trans.,' vol. vii, p. 131.

those peculiarities of change in blood current, presence of thrill, contraction of coats on stimulation, &c., to which I have referred; in eczema, ulcerations, and even gangrene of the feet, the presence of albuminuria from interference with the return of blood by the renal veins, the formation of a tumour in the abdomen in the course of the vein, and a condition of general ill-health.

The prognosis in all cases is most serious, but varies according to the cause of the disease. When the obstruction is due to the spread of a septic thrombus, a fatal result soon and inevitably follows. If the block in the circulation be due to the pressure from without of a tumour, unless this be of the nature of gumma, the prognosis is also bad, but it is not possible to say as to duration of life; the size and rapidity of increase of the growth must be taken into consideration. Supposing a thrombus, not of septic nature, has spread into or formed in the vein, then not only may the patient recover from the first onset of the disease,¹ but he may live for twenty years or more, liable, it is true, to those affections of the lower extremities which may follow slight injuries when the venous circulation is bad, and to general ill-health, but if the disease has shown itself in youth, he may be able to follow the most active of professions, simply exposed to increased danger from the large size of the superficial veins. The risk of embolism during the time that the clot is forming must be recollected as in other instances of intravenous clotting.

As regards treatment, absolute rest in bed must be enforced, not only when the disease is clearly present, but also in those cases of thrombosis of pelvic veins or deep veins of the leg, from which mischief may spread to the inferior vena cava. I need not consider the measures which should be employed when the obstruction is secondary to hepatic or other disease in the abdomen, nor when it is due to those constitutional affections which come for treatment to the physician. The surgeon is called upon chiefly to alleviate those conditions which follow the altered state of the circulation, to apply remedies for eczema or ulceration of the lower extremities, to give relief for hæmorrhoids, or to remove gangrenous portions

¹ Note C.

of the limbs, and here considerable judgment will be called for as to the propriety of simply removing dead tissues, or forming a new stump by amputation. In some cases support by bandages will only be required in order to relieve the feeling of tension, aching, and even pain caused by the over-distended veins, whilst the general health is attended to with care. In many cases there appears to have been no necessity for any support in the way of bandage or elastic appliance.

APPENDIX.

NOTE A. *Thrombosis of the cerebral sinuses*.—Since writing the above, a case of "Idiopathic Thrombosis of the Cerebral Sinuses and Veins of Galen in a Young Woman" has been published (see '*Lancet*,' 1888, p. 1124, vol. ii) by Dr. Douglas Powell, of the Middlesex Hospital. He does not, however, look upon anæmia as a sufficient cause. Much information on the subject is given in the editorial remarks to Dr. Powell's case, and in the '*Lancet*' of the week following, including the following references: Hubner, '*Ranking's Abstracts*,' vol. i, 1869, p. 9. Corner, '*Med. Times and Gaz.*,' vol. i, p. 400, 1858; vol. ii, p. 874, 1881 (Coupland). Bright, '*Medical Reports*,' vol. ii. Dowse, '*Lancet*,' vol. i, p. 132, 1876. Bristowe, '*Diseases of the Nervous System*,' Chap. xii, p. 184. Tuckwell, '*St. Bartholomew's Hospital Reports*,' vol. x. Andrew, '*Trans. Path. Soc.*,' xvi, p. 27. Wilks, '*Diseases of the Nervous System*.' Church, '*St. Bartholomew's Hospital Reports*,' 1869, p. 178. Crisp, '*Trans. Path. Soc.*,' vol. x. Cruveilhier, *Livr. xxxv*, p. 1. Dusch, *Syden. Soc. 'Selected Monographs*,' 1861.

NOTE B. *Dilatation of the abdominal veins*.—The curious appearance presented by the dilated and irregularly tortuous veins of the lower abdomen and the thighs, presented by patients suffering from obstruction of the inferior vena cava, has been long recognised. Marcus Aurelius Severinus gave it the name of *Caput Medusæ*. It is well shown by a plate in the atlas of Cruveilhier ('*Pathological Atlas*,' *Livre xvi*, pl. 6).

NOTE C. Two cases worth mentioning were under the care of Prof. Kussmaul ('*Med. Times and Gaz.*,' vol. ii, p. 119, 1861). Case 1.—Female, æt. 30. Enlarged veins of the lower extremities and lower abdomen, the thickness of the little finger in places, especially on the outer side of the right thigh, forming thick pads. Current of blood upwards. Followed jaundice connected with immense hydropic condition of the lower extremities fifteen years before. A tumour of the spleen was present. The general health was good, but she suffered from ulcer of the foot. Case 2.—Male, æt. 20. A scrofulous patient

who had suffered from various abscesses. Origin probably due to inflammatory mischief in the pelvis. It followed ascites, œdema of the left leg, scrotum, and right leg; diarrhœa and vomiting persisted for some time. The direction of blood-current could not be seen. His general health was good, but spleen large and glands swollen. The veins extended no higher than the umbilicus. Another case was shown to the Medical Society in 1886 by Mr. Fenwick. He was a soldier, æt. 29. The symptoms followed some time after the passage of pus per rectum, supposed to have come from an hepatic abscess. He applied three years after the first symptoms, when he was in hospital at Rangoon, for ulceration of the legs due to the varicose condition of the veins.

Those interested in this subject may also refer to—

Block, A. 'Ueber obliteration der Vena Cava Inferior,' Jena, 1880 (M. Hemsdorf, 30, p. 80). 'France Méd.,' Paris, 1881, vol. xxviii, p. 194; 1888, vol. i, pp. 410—413. 'Charité Ann.,' 1879, Berlin, 1881, vol. vi, pp. 511—514. 'Med. Jahrsb.' (Wien), 1881, pp. 509—512. 'Med. Berl.,' vol. ii, Demme. 'Med. Wochenschrift,' Nos. 39 and 40, 1876. 'New Orleans Med. and Surg. Journ.,' 1881-2, vol. x, pp. 801—813. 'Med. Gaz.,' New York, 1882, vol. lx, 378.

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